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NEWS MEDIA CONTACTS:
Teri Ehresman, 208-526-7785 (O), 208-521-9882 (C), teri.ehresman@inl.gov
Misty Benjamin, 208-526-5940, misty.benjamin@inl.gov

Hot wire probe snags first-place award

IDAHO FALLS, Idaho — University of Idaho student Joshua Daw who is completing his doctoral thesis work at Idaho National Laboratory's High Temperature Test Laboratory (HTTL) is being honored by his peers for a nuclear research innovation.

He recently earned first prize in the Fuel Cycle Research Innovations competition for his paper, "Hot Wire Needle Probe for In-Reactor Thermal Conductivity Measurement" (IEEE Sensors, August, 2012). In November, he will travel to the American Nuclear Society meeting in Washington, D.C., to accept the award.

Daw's winning work, completed with INL researchers Joy Rempe and Darrell Knudson, addresses the question of how to measure thermal conductivity during irradiation. Thermal conductivity — which measures how materials conduct heat — is considered "one of the most important physical characteristics of fuels," Daw explains. In most irradiated materials, it is measured by evaluating samples after reactor irradiation. This "cook and look" approach, as Rempe calls it, is an invasive and expensive process.

Previous methods for taking these measurements during irradiation required several assumptions that limit accuracy. Working at the HTTL, this team developed a method to make such measurements with a hot wire needle probe. High quality thermophysical property data collected using an in-pile method such as Daw's could lead to better simulation design codes and improvements to the next generation of nuclear reactors.

"I am constantly challenged and always learning," said Daw of his work. He began studying engineering with the intention of becoming a golf club designer, and it was a DOE-funded, UI and INL research opportunity at the HTTL that led him to high-temperature instrumentation instead.

The award, which is part of the U.S. Department of Energy's Innovations award program, is given to support innovation and higher education in disciplines related to the nuclear fuel cycle.

"It is always nice to be recognized for the work we do," Daw said. Rempe, his mentor, said Daw's "ongoing effort to lead the development and deployment of high-temperature ultrasonic thermometers is not only beneficial to the DOE's Advanced Fuel program but is also generating international interest."

Daw expects to complete his Ph.D. program next May. As for post-doc plans, Daw, who plays golf every chance he gets during his free-time, jokes, "Unfortunately, there are a few more degrees I am interested in, so who knows?"

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